



Knobloch syndrome

Knobloch syndrome is a rare condition characterized by severe vision problems and a skull defect.

A characteristic feature of Knobloch syndrome is extreme nearsightedness (high myopia). In addition, several other eye abnormalities are common in people with this condition. Most affected individuals have vitreoretinal degeneration, which is breakdown (degeneration) of two structures in the eye called the vitreous and the retina. The vitreous is the gelatin-like substance that fills the eye, and the retina is the light-sensitive tissue at the back of the eye. Vitreoretinal degeneration often leads to separation of the retina from the back of the eye (retinal detachment). Affected individuals may also have abnormalities in the central area of the retina, called the macula. The macula is responsible for sharp central vision, which is needed for detailed tasks such as reading, driving, and recognizing faces. Due to abnormalities in the vitreous, retina, and macula, people with Knobloch syndrome often develop blindness in one or both eyes.

Another characteristic feature of Knobloch syndrome is a skull defect called an occipital encephalocele, which is a sac-like protrusion of the brain (encephalocele) through a defect in the bone at the base of the skull (occipital bone). Some affected individuals have been diagnosed with a different skull defect in the occipital region, and it is unclear whether the defect is always a true encephalocele. In other conditions, encephaloceles may be associated with intellectual disability; however, most people with Knobloch syndrome have normal intelligence.

Frequency

Knobloch syndrome is a rare condition. However, the exact prevalence of the condition is unknown.

Genetic Changes

Mutations in the *COL18A1* gene can cause Knobloch syndrome. The *COL18A1* gene provides instructions for making a protein that forms collagen XVIII, which is found in the basement membranes of tissues throughout the body. Basement membranes are thin, sheet-like structures that separate and support cells in these tissues. Collagen XVIII is found in the basement membranes of several parts of the eye, including the vitreous and retina, among other tissues. Little is known about the function of this protein, but it appears to be involved in normal development of the eye.

Several mutations in the *COL18A1* gene have been identified in people with Knobloch syndrome. Most *COL18A1* gene mutations lead to an abnormally short version of the

genetic blueprint used to make the collagen XVIII protein. Although the process is unclear, the *COL18A1* gene mutations result in the loss of collagen XVIII protein, which likely causes the signs and symptoms of Knobloch syndrome.

When the condition is caused by *COL18A1* gene mutations, it is sometimes referred to as Knobloch syndrome type I. Research indicates that mutations in at least two other genes that have not been identified may cause Knobloch syndrome types II and III. Although they are caused by alterations in different genes, the three types of the condition have similar signs and symptoms.

Inheritance Pattern

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.

Other Names for This Condition

- retinal detachment and occipital encephalocele

Diagnosis & Management

Genetic Testing

- Genetic Testing Registry: Knobloch syndrome 1
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C1849409/>

Other Diagnosis and Management Resources

- American Academy of Ophthalmology: Eye Smart
<https://www.aao.org/eye-health>
- JAMA Patient Page: Retinal Detachment
<http://jamanetwork.com/journals/jama/fullarticle/1148332>
- National Eye Institute: Facts About Retinal Detachment
<https://nei.nih.gov/health/retinaldetach/retinaldetach>
- Prevent Blindness America: Retinal Tears and Detachments
<http://www.preventblindness.org/retinal-tears-and-detachments>

General Information from MedlinePlus

- Diagnostic Tests
<https://medlineplus.gov/diagnostictests.html>
- Drug Therapy
<https://medlineplus.gov/drugtherapy.html>

- Genetic Counseling
<https://medlineplus.gov/geneticcounseling.html>
- Palliative Care
<https://medlineplus.gov/palliativecare.html>
- Surgery and Rehabilitation
<https://medlineplus.gov/surgeryandrehabilitation.html>

Additional Information & Resources

MedlinePlus

- Encyclopedia: Eye
<https://medlineplus.gov/ency/imagepages/1094.htm>
- Encyclopedia: Nearsightedness
<https://medlineplus.gov/ency/article/001023.htm>
- Encyclopedia: Retinal Detachment
<https://medlineplus.gov/ency/article/001027.htm>
- Health Topic: Retinal Disorders
<https://medlineplus.gov/retinaldisorders.html>

Genetic and Rare Diseases Information Center

- Knobloch syndrome
<https://rarediseases.info.nih.gov/diseases/380/knobloch-syndrome>

Additional NIH Resources

- National Eye Institute: Facts About Retinal Detachment
<https://nei.nih.gov/health/retinaldetach/retinaldetach>
- National Institute of Neurological Disorders and Stroke: Encephaloceles
<https://www.ninds.nih.gov/Disorders/All-Disorders/Encephaloceles-Information-Page>

Educational Resources

- Boston Children's Hospital: Retinal Disorders Q&A
http://www.childrenshospital.org/centers-and-services/programs/o_-z/pediatric-retina-degeneration-service/retina-disorders-q_a
- Disease InfoSearch: Knobloch syndrome 1
<http://www.diseaseinfosearch.org/Knobloch+syndrome+1/8712>
- JAMA Patient Page: Retinal Detachment
<http://jamanetwork.com/journals/jama/fullarticle/1148332>

- KidsHealth from Nemours: Eyes
<http://kidshealth.org/en/parents/eyes.html>
- MalaCards: knobloch syndrome
http://www.malacards.org/card/knobloch_syndrome
- Orphanet: Knobloch syndrome
http://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=1571

Patient Support and Advocacy Resources

- Foundation Fighting Blindness
<http://www.blindness.org/>
- Prevent Blindness America
<http://www.preventblindness.org/>
- University of Kansas Medical Center: Retinal Degeneration
<http://www.kumc.edu/gec/support/retinal.html>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28knobloch+syndrome%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3240+days%22%5Bdp%5D>

OMIM

- KNOBLOCH SYNDROME 1
<http://omim.org/entry/267750>

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